

## 25. Island streams

Tutuila Island has about 141 small streams that flow year-round along at least a portion of their main channel. These streams are steep, shallow and short (most are less than a mile long). Stream flows are generally low but they can flood quickly in response to heavy downpours. But even with the high rainfall in our mountains (200-300 inches per year), the water drains quickly to sea or percolates into the porous volcanic soil to recharge our groundwater supply of drinking water.

Our streams support surprisingly few species -- there are only about 8-12 freshwater fish species, and not many more freshwater invertebrates. The principal species are freshwater eels (*tuna*), gobies (*apofu*, *mano'o*), mountain bass (*sesele*, *inato*), shrimp (*ulavai*) and snails (*sisivai*). Additional species may enter the lower ends of streams, but they are not restricted to a freshwater stream environment. Three non-native fish species were also introduced here, probably in the 1970s: mollies (*fo-vai*; *Poecilia mexicana*) and mosquitofish (*Gambusia affinis*) to control mosquitoes, and tilapia (*Oreochromis mossambicus*) to grow in aquaculture. The impact of these alien species on the native populations is not known. Additionally, we can only wonder about the impact of the alien marine toad (*lage*) that sometimes has thousands of its young tadpoles swimming in local creeks.



The low number of species in our streams is in stark contrast to the many marine species living in our coastal marine waters (890 fish species and countless invertebrates). Part of the explanation for this difference is simply that our streams are small and offer limited habitat for stream-dwelling organisms. But another more interesting aspect of this low diversity is: how did any freshwater species get to American Samoa in the first place? We are a small island surrounded by hundreds of miles of deep ocean. Freshwater species generally cannot survive in saltwater, so how could these freshwater fish, shrimps and snails cross the ocean barrier to get here?

The trick is that they all have a marine stage in their life cycle. After they spawn, their newly hatched larvae wash out of the stream into the ocean where they drift about as marine plankton for a few weeks or months. Some make their way back to a coastline where they seek a stream to live out the rest of their lives. It might be expected that the few freshwater species that got to our remote islands have evolved over thousands of years into unique (endemic) species found nowhere else in the world, but the opposite is generally true. The marine stage of these species allows a wide dispersal and continual genetic mixing of populations, so most of the species inhabiting our streams are widely distributed across the South Pacific.

Because streams drain the valleys we live in, they serve as good indicators of how well we are taking care of the land. Sad to say the message is not good. Our streams once provided food and drinking water, but now they are treated as a place for people to throw rubbish and piggery wastes. There have even been deaths in American Samoa due to leptospirosis, a bacteria from piggeries and other animals that pollutes many streams. And, after a heavy rainfall, some streams turn chocolate brown with the dirt that erodes from the landscape. Much of this soil erosion is due to poor land-use practices such as the farmer's bare-earth clearings for plantations on steep mountain slopes and the run-off from inadequately designed construction sites. In the former case, the farmer not only loses the soil needed to grow his crops, but the eroded dirt fouls our streams and ends up in coastal waters where it harms our coral reefs. It does not have to be this way. There are better ways to dispose of rubbish and to prevent erosion that can make streams a healthier place for fish as well as for the children who play in the streams.

P.Craig, NPS

## 26. Life in a Samoan stream: fish, snails & shrimp

Streams are the plumbing of our islands. They rely solely on rain, which seeps from steep rainforest-clad hills and trickles through the porous volcanic soil carrying with it the products of the land. Small streams join with others to create a mosaic of channels across the islands. Waterfalls, cascades, pools and riffles make each stream unique and influence the kinds of animals found there.

Our freshwater stream animals play an important role in maintaining a healthy stream ecosystem. These species might be overlooked because they are shy and rather blandly colored, which might lead to the assumption that they are not there at all, but that of course is not true. The best way to observe them is to find a spot on a rock and quietly watch until they emerge from their hiding places. Keep in mind that from the animal's point of view there is a lot going on. Animals are constantly interacting with each other as well as with their environment. The presence of a predator, for example, will have a huge influence on the behavior of its prey. It is a constant game of cat and mouse, eat or be eaten. Habitat type, or where an animal likes to live, is also very important. Certain species prefer pools, others like shallow riffles, and for most species, waterfalls are barriers to their upstream movements although a few hardy species can climb up them.

**Fish.** Predatory fishes, like the freshwater eel (*Angulia* spp.), mountain bass (*Kulia* spp.), and dusky sleeper (*Eleotris fusca*) tend to dominate the lower reaches of a stream and feed on smaller fish and shrimp. They are only average climbers and cannot make it up the steep slopes of a waterfall. Instead they rely mainly on their powerful swimming and gliding ability to move through small rapids and over large boulders and rocks. Look for eels in crevices and holes. Mountain bass are often seen in pools not far from the ocean. Their silvery sides and flag-like tails make them easy to spot. The dusky sleeper uses stealth and surprise to catch its prey. It props itself on rocks using its fins and turns darker for camouflage when ambushing prey. For this reason this species is not an easy one to spot.



Herbivorous fishes, like the small gobies (*Stiphodon* spp. and *Sicyopterus* spp.), are usually present in large numbers. They may be seen in quiet riffles and pools grazing on long green algal strands or the slippery brown algae coating the rocks. An interesting feature of the goby is that its pelvic fins form a suction cup that enables the goby to cling to rocks and climb waterfalls. One goby (*Stiphodon hydoreibatus*) is endemic to Samoa and found nowhere else in the world.



**Snails.** Stream snails, which all belong to the family Neritidae, are herbivores that graze on the algae growing on stream rocks. About a dozen species are known locally. Two distinct types of neritid snails are present. One is the rounded black/brown shell of the *Neritina* or *Clithon* species. The shell of these has little or no spire and an interesting device called an "operculum" that acts like a trap door. This allows the snail to retract into its shell and literally close the door -- a great mechanism to have when you do not want to be eaten.



Neritina variegata



Clithron corona



Septaria sanguisuga

The other type of shell is the cap-like *Septaria* species. It has no visible operculum and therefore the snail cannot retract into its shell. Instead it clamps to rocks with its muscular foot, making it very hard to detach. This is useful when you live in turbulent rapids or on steep walls. Besides these two differences, you may also notice variations in shell color, pattern and texture. They range from light to very dark brown with zigzag, wavy, or straight lines, or none at all. They may be smooth and shiny or grooved and wrinkled. Some even have horns.

A small turret shaped snail (*Melanoides* sp.) can also be found near the edge of streams in gravel and mud. This species is found throughout the Pacific.

**Shrimp.** Probably the most versatile freshwater species are the shrimp. American Samoa is home to two families, Atyidae and Palaemonidae, each with 4-5 species. The palaemonid *Macrobrachium* shrimp are possibly the most well known and can be easily seen in the lower to middle reaches of our streams. They are easy to identify by their large pincers. When wading through pools and shallow runs, watch for these shrimp as they make a quick retreat at your approach. Although shy, they will reappear if you keep still. These scavengers feed on both plant and animal material. They may also dislodge *Neritina* and *Corona* snails from rocks, open them up and devour them.



Macrobrachium lars

Atyidae shrimp can be found throughout many clean streams. Some are excellent climbers and congregate in the lee of rocks and boulders of fast flowing streams. Others seek a quiet place in the vegetation and roots of plants near a stream edge where flow is slow. These shrimp exhibit distinct feeding behaviors. In fast flowing water they orient themselves in the direction of the current and spread the fine brushes on their front legs to form upturned umbrellas. They use these to filter food particles carried in the current and then push them into their mouth. In slower moving water they use their brushes to pluck food items from plants and gravel.

Atyid shrimp  
with leg brushes

**Stream insects.** Although some insects are common inhabitants in streams around the world, they are not well-represented on our small oceanic islands. Few of the terrestrial insects we see in American Samoa have an aquatic stage in their life cycle (some exceptions being a few dragonflies, damselflies, midges, mayflies, and beetles).

## 27. Snakes In Samoa !

Snakes in Samoa? You bet. Two kinds, one right here on Tutuila Island and the other on Ta'u Island. Fortunately, neither is the dreaded brown tree snake (more about that below). Also fortunately, neither is poisonous, both mind their own business, and they are no threat to anyone.

On Tutuila, we have an unusually small black snake that looks like an odd earthworm about 6 inches long. A closer inspection reveals that it has tiny scales. It's called the potted soil snake or blind burrowing snake (*Ramphotyphlops braminus*), because it has almost no eyes and it burrows through the soil. This secretive nocturnal snake is occasionally found by someone digging in their garden. It eats small soil creatures like termites and insect larvae.



This harmless snake is widely distributed around the world, but it is not native to our islands. It was probably introduced here when its eggs were carried in the soil attached to some imported plants or machinery. In 1993, it was found in the Tafuna area. Others were found in the Pago Pago area in 2001.

The other snake found infrequently on Ta'u Island is the *gata* or Pacific boa (*Candoia bibroni*). It also occurs in western Samoa. At one time it inhabited Tutuila Island (its bones were found there) but it went extinct for unknown reasons. On Ofu, an older resident remembers seeing one there when he was a child.

The Pacific boa is more commonly found on islands closer to Indonesia; American Samoa appears to be the eastward limit of its distribution. It can grow to a respectable length of 3 to 6 feet and is tan or darkly colored, but its coloration can be variable. This species is usually found in forests, it is active mainly at night, and it probably eats lizards, rats, and small birds and bird eggs.

The Pacific boa looks a lot like another undesirable snake species, the brown tree snake (*Boiga irregularis*), which we don't have in Samoa and hopefully never will. You may have heard that the brown tree snake invaded Guam and caused havoc there. It wiped out Guam's native bird species and helped decimate their fruit bat populations by eating the young bats left hanging in the trees when the adults flew off to find food.

Parents in Guam were even advised to keep their infants and small children away from this snake because it is somewhat poisonous and occasionally has been caught lunging on a baby's arm. How's that for a reptilian nightmare?



Not in American Samoa yet !  
Brown tree snake

Well, not to fear. We do not have the brown tree snake in Samoa. So, if you see a large snake on Ta'u island, don't kill it. However, if you see one on Tutuila Island, it is very important that you send it to DMWR for identification. It is essential that we keep the brown tree snake out of American Samoa. Several of them have already slipped into Hawaii hidden in air cargo shipments from Guam. The snakes will crawl into the cargo or onto the plane's landing gear and then go wherever the plane goes.

A final note. On rare occasions, sea snakes have been seen in our coastal waters. One verified air-breathing banded sea snake (probably *Laticauda columbrina*) was collected here in 2000. However, most local sightings of “sea snakes” are actually fish (eels) that are very snake-like in appearance. It would not be difficult to confuse the two:

Banded sea snake



Snake eel (a fish)



Moray eel (a fish)



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## 28. Toads everywhere

The marine or cane toad (*Bufo marinus*) is a relatively recent introduction to American Samoa. It was purposely brought here from Hawaii in 1954 to control mosquitoes or insect pests that attack taro. Toads (*lage*) were introduced into artificial ponds at Taputimu on Tutuila, and from there, stocks were liberated in Tafuna and Utulei. The toads then expanded their range to include all of Tutuila, from sea level to the top of Mt. Alava. Fortunately, they have not yet been transported to Manu'a or to western Samoa.



The toads breed year-round here. All they need is standing fresh or slightly brackish water in which to lay their eggs. Thousands of eggs that look like a string of black and white pearls are laid by each female. Within a week the eggs hatch into small black tadpoles that feed voraciously on aquatic plants. The tadpoles look defenseless but are thought to be toxic to birds and other animals. Within a month these tadpoles develop legs and change into adult toads.



As adults, they typically hide under boards or vegetation during the heat of the day and emerge at night to feed on insects and other invertebrates. They eat snails, millipedes, centipedes, spiders, roaches, moths, flies, caterpillars, termites, beetles, ants, earthworms, grasses, and even an occasional small toad.

How many toads inhabit Tutuila Island and how many bugs do they consume each night? In a wildlife study conducted in 1976, biologists estimated that over 2 million toads lived here with us. Some rough calculations suggest that these toads consume about 5 tons of bugs every night!

To some people it might appear that the toad is beneficial. One must keep in mind, however, that many of those insects would have been eaten by native birds and perhaps by the small insect-eating sheath-tailed bat (*pe'ape'avai*) that is now extremely rare in American Samoa. No one has examined the actual impacts the toads are having on our native wildlife, but there are many examples of introduced species causing the extinction of native plants and animals by out-competing them for food or other resources.

Another concern involving the toad is its toxic skin glands. The adults have two large parotid glands on their "shoulders" that secrete a creamy white fluid when handled. These secretions are highly toxic if eaten, rubbed into the eyes, or brought into contact with mucous membranes. Dogs have died when they mouthed these toads. In addition, a high incidence of the salmonella bacteria occurs in toads, thus an abundance of toads near drinking water supplies may lead to bacterial contamination.

## 29. Disappearing land snails

Snails belong to the second largest group of animals on earth, the mollusks. Only the arthropods (insects, crustaceans and their relatives) have more known species. Snails are found just about everywhere – the ocean, streams, lakes, and on land. Over 90 native species of land snails occur in the Samoan Archipelago. Of these, 64 occur in western Samoa and 47 in American Samoa (many are found in both places). Slugs, which are snail-like mollusks that have no shell, also occur locally, but none is a native species -- all are recent introductions to our islands.



Many of our native land snails are found only on our islands – that is, they are endemic to the Samoan Archipelago. Some of them even occur only on a single island, so they are endemic to that island. Their shells come in all shapes and sizes – flat, tall, rounded or spiraled. Some live in trees, where they may eat dying leaves. Others live on the ground and probably feed on dead leaves. Together with fungi and other microorganisms that help to decompose the leaf debris, snails contribute to the cycling of nutrients through the ecosystem.



We do not know much about the basic biology of these land snails. Some species have separate males and females, but others are hermaphrodites, where each snail is both male and female. However, most hermaphroditic snails still reproduce by mating with another individual – each snail can act simultaneously as a male and as a female, or in some species the snails take turns being males and females. Most snails lay eggs, but some give birth to live young – miniature snails that simply crawl away. The snails that produce live young tend to grow and reproduce very slowly – some of the tree snails may take over a year to reach full size and may live as long as 5-10 years, producing only 10-20 young per year. This contrasts with egg-laying species that probably grow much quicker, produce many eggs, but do not live as long.

There are three possible ways that land snails could have crossed the ocean to get to our remote islands. First, they might have been carried over the ocean from a distant continent – or from another island – on rafts of driftwood or fallen logs. But salt kills land snails, so this seems unlikely. Perhaps they were carried here by birds. Sometimes snails get caught up in the feathers of birds, especially if they are really small snails. And third, they might have been blown by the wind. Scientists have found that very small snails can indeed be blown long distances by strong winds. A small snail attached to a leaf, caught up in a cyclone, could be blown hundreds, perhaps thousands of miles across the ocean. Through evolutionary time (millions of years), these seemingly unlikely events had only to happen very occasionally in order for a few land snails to eventually colonize our islands.



Once the land snails arrived and managed to survive, they began to evolve to local conditions. Some species changed and became so different from their ancestors that scientists now identify them as different species. Others evolved into more than one species. This is how the Samoan islands came to have many land snail species found nowhere else on earth – they evolved after they arrived here.

Many of the local snail species have attractively colored shells and have often been used in the making of *ula* or *leis* and for other ornamental purposes. For instance, the hanging light fixtures in the old lobby of the Rainmaker Hotel in Pago Pago contained 10,000 or more shells of tree snails that used to be abundant in the forests of Tutuila.

But now many of our local snail species are disappearing. At least seven species have become extremely rare and one of them, *Diastole matafaoi* from Tutuila, is now extinct. Others are undoubtedly in trouble but have simply not been fully evaluated yet. The two main reasons for their decline are the same reasons that biodiversity is vanishing all over the world. First is habitat destruction or modification. As native forest is cut down for timber or cleared for agriculture or urban development, the habitat of those snail species that depend on the forest disappears and so the snails disappear too. Second is the introduction to the islands of alien species – species that have been brought to the islands by humans, either on purpose or accidentally. These aliens include pigs that destroy the forest by rooting for food and creating wallows, plants that grow and reproduce more strongly than the native species and replace them in the forest, birds that spread alien plants by carrying their seeds into native forest, rats and ants that prey on snails, and many other species that people have introduced to the islands.



These alien species also include snails and slugs that come from elsewhere in the world. Most people are likely to see only these aliens unless they hike into the most pristine native forest. Perhaps the most commonly seen are the giant African snail (*sisi aferika*, *Achatina fulica*) and the large black or brown slugs. But there are many other species that are not so obvious but that can be found easily just by turning over some leaves on the ground almost anywhere in the islands. The giant African snail is a pest of agriculture and in

gardens but some of these other less well-known species may also be causing problems for the native snail species. Two of them (*Subulina octona* and *Paropeas achatinaceum*) are now the most abundant snails in the leaf debris of native forest throughout the islands. It is quite possible that they are impacting native snails by out-competing them for the resources they depend upon.



Another alien snail, the predatory snail known as the ‘cannibal snail’ or ‘rosy wolf snail’ (*Euglandina rosea*) was introduced in an ill-conceived attempt to control the giant African snail by eating it. It was introduced even though there is no scientific evidence that it would reduce populations of the African snail. The problem is that it attacks native snail species that had evolved in the absence of such aggressive predators. Some of our local species reproduce at a very slow rate and this means that their

populations are highly vulnerable to sustained predation. *Euglandina rosea* is thought to have been introduced only to Tutuila and Ta’u. In western Samoa it was introduced to Upolu in the 1990s.

An even more voracious predator of snails, the flatworm *Platydemus manokwari*, was unfortunately introduced to Upolu in 2003 to control the African snail. This free-living flatworm appears to be common on Tutuila Island as well. It is black or dark brown, with a single line down its back, and it can grow to almost 3 inches long and 1/4 inch wide. This flatworm is believed to have decimated snail populations on other Pacific islands.





### 30. Four interesting insects: afato, se, alisi, lelefue

Insects are an impressive group. They are extremely abundant and highly diverse (over 800,000 species worldwide), they inhabit almost every terrestrial and aquatic habitat imaginable, and they have been on earth long before the dinosaurs ever roamed. Over 2,500 species have been recorded in the Samoan Archipelago, with many more yet to be documented. Four large but somewhat secretive insects are featured here:



Giant longhorn beetle. These beetles are unusual for two reasons: they grow very large and people eat them. The adult beetle pictured here was almost 3 inches long from head to tail. What does it eat with those large powerful jaws? It lays its eggs in standing dead trees (particularly *mamalava*, *tufaso*, *tavai*) and after hatching, the larvae feed on the surrounding wood. These larvae (*afato*) grow very large and are collected and eaten in Samoa, Fiji and probably throughout the South Pacific. Two villages in Savai'i are particularly well known for harvesting many *afato*: Gataivai and Aopo. *Afato* are fed coconut shavings, and then they are often eaten with coconut cream, and they taste like .... coconut. But here in American Samoa, times are changing – one person said he had eaten *afato* in the past but now he prefers to eat a Big Mac.

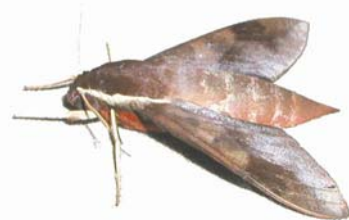
Walking stick (*se*). These large green or brown insects can grow up to 5 inches long. They usually remain motionless and look like a branch or small twig, hoping that this camouflage will spare them from being eaten by a hungry Samoan starling (*fuia*). These slow-moving 'sticks' feed on leaves, most notably coconut fronds. Some can fly, although not very gracefully -- if one lands on a person, a local belief is that it is a messenger announcing that someone will be coming to visit you.



Katydid (*alisi*). Here's the insect that makes all that noise at dusk. As the sun sets, katydids start the evening with a loud screechy chorus that lasts about 20 minutes. After a little warm-up noise, they synchronize with their neighbors so that all of them are screech screeching in unison. These are male katydids trying to attract females. The sound is produced as they rub special structures on their front wings, back and forth. Katydid are green, about 1.5 inches long, and look like a leaf. Just like the walking sticks, katydids hope their camouflage make them difficult to see. Katydid are related to crickets and grasshoppers and are sometimes called long-horned grasshoppers.



Hummingbird moth (*lelefua*). At dusk you might be surprised to see what looks like a hummingbird hovering in front of a flower, sipping its nectar. This is actually a thick-bodied moth with an extremely rapid wing beat and a long proboscis that it sticks down the flower tubes. This is a good example of convergent evolution, where two very different kinds of organisms (a bird and a moth) evolved a similar way to extract nectar out of long, delicate flowers. The moth is also known as the hawk or sphinx moth.



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## 31. The bugs in your house

There will always be some bugs in your house, so relax a little and get used to them. Before you know it, you will be sweeping termite droppings off your kitchen counter as if you didn't have a care in the world. Several common household insects (beetles, moths, termites, cockroaches, wasps, ants) and other arthropods (centipedes, millipedes, spiders) are described below.

Centipede (*atualoa*). The large, 6-inch brown centipede (*Scolopendra subspinipes*) is well known locally but not commonly seen. It is quite fast and scary looking as it searches for things to eat at night. Occasionally someone gets bitten and it can be extremely painful. The local Emergency Medical Services responds to a few calls each month, particularly after a lot of rainfall has driven the *atualoa* to higher grounds. People vary in their response to a bite, but for most, there is not much that can be done about it, and the pain will usually lessen in a few hours.



Millipedes (*anufesaina*). Millipedes are neither insects nor worms but a different kind of arthropod. They differ from centipedes in being slower, rounder and in having two pairs of little legs per body segment. Our local millipedes grow up to about two inches long. They are active at night and feed primarily on rotting wood and leaves. They are generally harmless and curl up when threatened. However, *anufesaina* have defensive glands along the sides of their body that can produce foul and sometimes poisonous secretions, and they can cause a burn-like pain on your skin if you squash one.

Cockroaches (*moga moga*). At least give cockroaches some credit for inhabiting earth millions of years before we humans ever showed up. Nonetheless, it is their fate to be despised insects associated with filth. They are extremely hardy scavengers that will eat almost anything. One species living here is the large non-native American cockroach, *Periplaneta americana*. Their egg cases look like brown beans, each containing 10-20 eggs that hatch in 5-7 weeks. Their total life span is probably 2 years or so. Cockroaches are nocturnal, so if they are also seen during daytime, the house is probably heavily infested.



Ensign wasps. A wasp yes, but a good one, so don't swat it. You'll occasionally see these spider-like black insects flying around the house. They look like they were built out of parts that don't quite match up. There's a large head, and a boxy middle part (thorax), followed by a tiny posterior (abdomen) hanging off the back that bobs up and down like a flag being waved (the "ensign"). These wasps don't sting people. Instead they use their "stinger" to lay their eggs inside cockroach egg cases. Before the young cockroaches can emerge from the case, the wasp eggs hatch first and eat all the cockroach eggs. All in all, these little "black flag" wasps probably kill a lot more cockroaches than we ever could with our spray-can insecticides.

Termites. There are usually two times when we notice termites in the house. The first is when a large swarm of them suddenly appears fluttering around a light bulb in the evening. These are male and female termites in love. What identifies them as termites is their large, equal-size pair of wings, and that they shed their wings after their nuptial flight. The second time we notice them is when we see the daily piles



of their droppings on the kitchen counter or floor. At one point, their droppings in my house were so numerous, I collected them in plastic bags, with the idea that maybe I could market them as “South Pacific pollen” to some health food store in California.



Ambrosia beetles. These irritating little beetles appear in the early evening, fly towards the light, and crawl around on you like fleas in your hair. If you don’t know what I’m talking about, you are one of the privileged people whom these beetles do not bother. These wood-boring insects (*Xyleborus* sp.) are dark brown and 2.5 mm long. They are called ambrosia beetles because they carry a fungus (the “ambrosia”) that they use to inoculate the tunnels that they drill into a tree. The fungus grows in the tunnels and provides food for their larvae. After mating, the female beetles emerge and go in search of another tree to lay their eggs in.

Casebearer moth. At some point you may notice these odd little insects dragging around their flat diamond-shaped cases. These are the larvae of the small casebearer moth (*Phereoeca* sp.). The larva is visible when it extends out of the case, but it retreats into the case when threatened or turns around and pops out the other end. They plod on, as if they really had someplace to go. The larger cases are about 1-cm in length and are made out of silk fibers encrusted with debris such as sand particles, hair and insect parts. The larva lives and grows in the case for about 2 months, feeding on things like old spider webs, wool fibers, etc. After pupating, the larva develops into a tiny gray moth that measures about 5 mm from head to tip of wings. A female moth lives only a week and lays about 200 eggs.

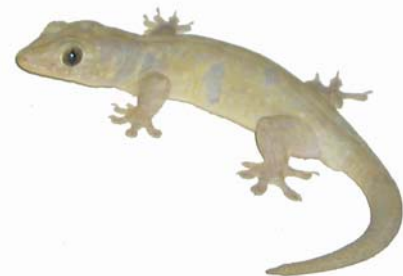


Spiders (*apogaleveve*). We have a variety of web-spinning spiders in the house, as well as hunting spiders that don’t make webs but actively search for their prey. Some are quite big and may give you a fright, but none are known to cause us problems. Hunting spiders include jumping spiders (which hunt in the daytime and are common in houses), wolf spiders (not often seen in houses), and large huntsman spiders that are big enough to prey on large cockroaches.

Ants (*loi*). Ants occur everywhere in American Samoa. You may not notice them very much until you leave some leftover sweets or other food lying around and come back later to find it crawling with ants transporting it piece by piece or drop by drop back to their nest. One common species is the crazy ant, *Paratrechina longicornis*. They are black, about three millimeters long, and have long legs and antennae. They seem to be running all the time, and it’s amazing how fast they can appear by the dozens around some spilled soda or juice. When disturbed they run even faster, circling and zigzagging all over -- as if they really are crazy.



Bug eaters: geckos (*mo’o*). From the abundance of gecko droppings around the house, it’s apparent that the geckos hanging on the walls are eating lots of bugs. Think of these droppings as little blessings in disguise.



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